

Adventures with Breadth

A story of interdisciplinary innovation

Janet McCalman, Loris Muir and Christopher Soeterboek

Adventures with breadth: a story of interdisciplinary innovation

I like the whole reaching, overall perspective it gives on life. I also found that it challenged accepted ways of viewing the world, and got me thinking in new ways. It also scared me because I didn't realise that humanity is fucked. (A student in the first cohort)

So wrote a student who was three-quarters of the way through the 'maiden voyage' of a new interdisciplinary subject on the ecological history of humanity. A few weeks later, when we concluded the semester, we trust he was more optimistic about humanity's future and emboldened to play a part in making it. The ecological history of humanity is a challenging and unsettling subject, but so was the teaching of it for the first time. This is our story.

Universities are complex systems that are kept manageable by a large degree of inertia—or so we tell students when systemic glitches produce chaos. Major change and innovation are inherently difficult in big institutions where there are time lags created by long-term personal and institutional commitments. It is rare, therefore, for teaching academics to have the opportunity to revise curriculum on a large scale.

Major innovation is generally only possible when institutions are founded, and a great period of innovation in university teaching was in the 1960s and 1970s when new universities were opening and the intellectual climate encouraged radical re-thinking of traditional forms of education.

At the University of Melbourne, the introduction of the Melbourne Model has presented many of us with the chance to begin with a blank slate as though we are creating an entirely new university. This is especially so for those of us interested in interdisciplinary studies and this paper reports on the first iteration of one of the most distinctive features of the New Generation degrees: an interdisciplinary University Breadth Subject.

The Melbourne Model

The Melbourne Model proposes an undergraduate education that develops 'breadth', i.e. contrasting, complementary or integrative studies as well as the necessary 'depth' in discipline specialisation. Over the three years of the six New Generation degrees—Arts, Biomedicine, Commerce, Environments, Music and Science—students are required to take 25% of their subjects from studies outside their home faculty, or from a suite of interdisciplinary university breadth subjects (UBS), each of which must draw their knowledge base from the sciences, humanities

and social sciences. These university breadth subjects are expected to explore areas of inquiry that, because of their complexity, cannot be adequately surveyed by a single discipline. Climate change is the most obvious candidate for this interdisciplinary focus, and a sequence of studies over three years just on climate change, has become one of the unofficial flagships of the UBS programme and the Melbourne Model.

Interdisciplinary teaching and learning

The most recent curriculum experiment with interdisciplinary teaching came in the late 1960s and early 1970s, inspired by the radical new British campuses at Sussex and Warwick. In Australia, Murdoch, Wollongong and Griffith universities were among the most innovative. Griffith was explicitly established as an interdisciplinary university, a mission it continues to pursue despite the emergence of professional schools. (Franks, 2007)

The Melbourne Model approach to 'breadth' differs from these institutional missions. It is conceived as one part of an otherwise disciplinary-focussed undergraduate programme, and students in a number of the degrees need not engage with explicitly interdisciplinary studies should they not wish to. They can take complementary or parallel studies as 'breadth' for instance, such as mathematics or a language. In the general curriculum, there are some interdisciplinary foundation subjects in the New Generation Arts degree that are structured around key areas of inquiry such as 'democracy', 'self and others', 'knowing nature'. The new Bachelor of Environments is quite different: seeking to provide a shared foundation for future studies as diverse as environmental studies, agriculture and horticulture, architecture, town planning or engineering. This is altogether a more complicated challenge than the mounting of stand-alone interdisciplinary breadth subjects.

Breadth and interdisciplinarity in the past

'Breadth' in undergraduate studies is far from being a novelty at the University of Melbourne. For the first hundred years, a non-professional undergraduate education was considered to require some exposure to 'other ways of knowing' as we would say now, or to a 'liberal education' as it was understood then. Everyone was expected to have some acquaintance with a language other than English, and 'Science Russian' and 'Science German' were still required in the 1960s. Arts students found themselves studying botany or geology and the department of mathematics sat in the Arts Faculty.

This compulsory liberal education had its failings (like 'veggie science') and few emerged with the literacy in German or Russian to read professional literature. Furthermore, the rapid advances in science itself

by the 1940s put a liberal education across all branches of knowledge increasingly beyond the reach of many students. In response to the widening gulf between these two cultures, in 1946, Professor RG Wright proposed a programme in science-humanities that offered integrative, reflective studies of science, medicine and technology. Thus Melbourne became one of the first universities in the world to host a history and philosophy of science programme (HPS), which in time became a fully-fledged department with a Chair. HPS offered students from all disciplines the chance to use the tools and contextual perspectives of the humanities and social sciences, to explore science, medicine and technology, as epistemologies, as social constructs, cultures and as social and political actors. The teaching discourse drew on history, philosophy and sociology, but the subject matter was science. Many of the teaching staff and research students had backgrounds in science and had crossed into 'the other side' via HPS. Science students could take most of the department's subjects as science-credit, and students from arts and elsewhere as arts credit. HPS has broadened internationally to include interdisciplinary studies in environmental history and history of health and medicine, where tools and theoretical knowledge from other disciplines are integrated into the explanatory structures. There have been similar synergies between philosophy and cognitive science. (<http://www.hps.unimelb.edu.au/about/>)

Interdisciplinary history is a well-established international field with its own journals and conferences. (Rotberg, 1970) Interdisciplinary historians enlist other knowledge domains, in particular those relying on quantitative methods, to extend their range and repertoire, or to construct 'chains of explanation' that include the operations of the natural world. The French *Annales* school were the first notable practitioners of quantification as a means to studying deep structures over time, and it was Emmanuel Le Roy Ladurie who identified the 'Little Ice Age' that peaked in the 17th century by analysing the timing of the grape harvest in France: work that has become critical to the historical study of climate change. (Le Roy Ladurie, 1971) It is therefore not problematic to conceive of an interdisciplinary history subject that draws on knowledge domains outside the humanities: on the theory and findings of demography, economic history, sociology and anthropology from the social sciences; on physical and human geography; and on explanations that derive from microbiology, immunology, genetics, zoology, botany, geology, ecology and climatology. This was the mix that went into the first year university breadth subject, *An Ecological History of Humanity* that made its debut along with three other university breadth subjects, on the first day of the Melbourne Model.

If the initial conception of such an interdisciplinary history is not problematic in theory, it is of course still difficult to gestate and deliver a happy outcome. This is the story of one such experiment in innovation

My favourite subject, so interesting. An eye opener, course content is stimulating and enlightening. Everyone who does the subject loves it. Wish I could do it again. (10)

I have really enjoyed the diversity and depth that this subject has covered - it has far surpassed my expectations of a subject dedicated to only 'scientific' developments in human history. (15)

I have enjoyed thinking about the Big Picture although ambitious. I liked how the lectures attempted to link key aspects of humanity. I feel they are connected. This was a very relevant subject. (83)

which we hope to tell from three different yet equally candid perspectives: that of the lecturing and co-ordinating staff; of the tutoring staff at the coalface; and finally, of 277 of the 367 students as expressed in an anonymous survey.

Interdisciplinary history

An Ecological History of Humanity aspired to survey 150,000 years of human interaction with the natural world in a course of 24 lectures and 12 tutorials over 12 weeks. This was not entirely unrealistic: it is possible to create 'big picture' narratives of critical trends and transitions—on what the great French historian, Fernand Braudel called *la longue durée*: the 'long-run'. History, Braudel argued, was built on of deep structures of human life that were determined by climate, soil, water, disease organisms and of course, human action. As important as it is for historians to study what Simon Schama has termed 'the surface brilliance of events', human history is enacted against the backdrop of *la longue durée*: deep ecological structures that sustain life.

An Australian innovation has come from David Christian, who during his years teaching at Macquarie University, developed 'big history' that begins with the origins of the universe and concludes in the present day. He enlisted the support of physicists, biologists and many other specialists to construct a university subject and later a book in a common historical language. The book, *Maps of Time: An introduction to big history* (University of California Press, 2004) has been an international success and provided us with a core textbook for students. Humans don't appear until chapter 6 and it presents a daunting narrative to a first year student, both in its reach and length.

A valuable idea from Christian is that 'big history' is like going up into the air and looking back at the earth: the higher you ascend and the details disappear, the clearer become the larger contours and features. We hoped to persuade students that such a 'big picture' history was a valuable grounding for more detailed studies in many areas later at university; and that, in order to understand that 'big picture' as an ecology of humanity over time, we needed to employ some basic scientifically-derived explanations and insights.

The 'story' we wished to tell

We focussed on the major transitions in the human ecological story:

- The structures of life: the atmosphere, the aquasphere, the lithosphere, the biosphere or air, soils, water, living things and their co-dependence;
- From the evolution of humans to their global dispersal amidst extreme climate changes;

I enjoyed the early part of the course learning about human history and evolution and learning about diseases and their impact on society such as the plague. I enjoyed some of the readings specifically the first hand account on the plague and the ones describing what society was like and the different roles/abilities of men and women. (86)

I find this subject really interesting. The first few weeks could possibly have been put into context better because I think that's where a lot of people that got lost. I've probably enjoyed these lectures the most out of all my lectures (88)

I have particularly enjoyed the engaging. The discussion in tutorials has also been of a high standard. (89)

I found all the extended readings online very helpful and interesting. Even though we did move through earth's history very quickly, it was still good to know the basics and focus on different aspects which I had not considered - looking at trade and the interactions between the old and new world were very interesting topics. (93)

I thought the interactions between the students and tutor in the tutorials was very good. The content on early humans and the animals that lived in that era were also very good. (94)

- The 'nature of human nature': Neanderthals and the 'archaeology of love';
- The economy of hunter-gatherers; population control via breastfeeding (the San and Australian Aborigines);
- From foragers to farmers and the rise of complex, food-producing societies or 'civilisations';
- Microbes and human societies: zoonoses, endemic and epidemic disease, basic immunology;
- The rise and fall of empires (Rome) through ecological overload, conflict, parasitic elites and epidemic disease: i.e. the Four Horses of the Apocalypse
- The 'Malthusian Trap' of the organic economy in Eurasia where population growth was limited by famine and epidemics (Black Death, typhus, smallpox) and economic growth was constrained by energy and food shortages (timber, agricultural inefficiency);
- Climate change and its effects on human societies: Medieval warming, the Little Ice Age, late nineteenth century El Niño droughts and the making of China and India into Third World economies;
- The micro and macro-biological conquests of the Americas and Australia;
- The Columbian Exchange and Europe's 'great divergence' drawing on the biocapacity of the New World using African human energy, and colonial wealth extraction from India and China;
- The escape from the Malthusian trap via the replacement of solar energy by fossil fuels: the benefits versus the deficits of the industrial revolution;
- The modern population explosion and ecological overload on a global scale: food, disease, poverty, water shortage, and Climate Change
- Human cognitive potential to solve problems with science and technology, and adapt culturally to ecological change and challenges: concluding with the Brazilian landless workers' movement taking charge of their own destiny in an ecologically and socially sustainable way.

The variety of topics and readings have been really interesting, especially those with a great social focus incorporating of artwork, literature, etc has also enriched the course immensely. The course has me a good understanding of human history also allowing for a greater appreciation of the environment. (85)

It is a very big story, but it could be broken down into digestible case histories that illustrated the 'big picture' concepts about energy flows, sustainability and ecological overload; predatory elites and political resistance; power and political change; wealth creation and distribution. It was divided into two-week subsections:

1. **The Structures of Life:** from the atmosphere etc to the biosphere, to the anthroposphere; the evolution and dispersal of humans; human responses to the Pleistocene

[I liked] the opportunity to do my own research and reading without being overly distracted by required readings. (68)

2. **From Foragers to Farmers:** climate change and the Holocene; the domestication of plants and animals; microbes and humanity; the economy of foragers
3. **The Four Horsemen of the Apocalypse:** complex societies and the role of famine, pestilence, war and death in controlling population (Rome, From the plague of Justinian to the Black Death)
4. **Plundering New Worlds:** conquest of the Americas; energy flows from Africa, New World to enrich Europe
5. **Breaking nature's bounds:** escaping the 'Malthusian trap' of the organic, solar economy with fossil fuels
6. **Apocalypse Now?** Over population, climate change, ecological overload

With research tasks into accessible topics such as the history of contraception, domestication of plants and animals, sustainability and collapse, bubonic plague, dirt and the city, interspersed with debates over gender and human nature and finally the costs and benefits of the fossil economy and the growth it powered, students were able to be actively involved in the accumulating story and the building of a research base in their tutorial wiki sites.

Gestation

As we began to plan the lectures, we struggled with the key problem in presenting interdisciplinary work: integration. In an ideal world, we would have had the time and resources to choreograph each lecture with filmed inserts where we 'flashed' over to Cheryl Power in her laboratory, or Rob Day in his wetsuit by the ocean or Ian Thomas excavating an early agricultural settlement in Turkey, or David Tribe in a corn field in Africa, or Janet McCalman in the manuscript library. Neither could we do that in the classroom: the transitions as each lecturer changed microphone and struggled with the technology were too clumsy and our first-year student audience were impatient with interruptions. A number of us were painfully aware of the difficulty of integrating rotating lecturers from previous teaching experience, but that turned out to be the only way forward in the time available. Thus the first four weeks were dominated by lectures that were science-based: geography, ecology, microbiology as we laid down the foundations of our story.

We had intended to have the lectures written and rehearsed before the semester began, so that we would all be familiar with each other's scripts and could ensure that lectures connected with each other. However, in real life it proved too difficult to find sufficient time when all the team were on campus at the same time. We therefore went into the classroom

At the start of the course, the size of the lectures, the varying lecturers each week and the lack of cohesion, clarity and structure made the course overwhelming. Readings were not always clearly relevant or easily accessible, and often the amount of reading was very large (184)

Also many of the earlier lectures lacked relevance and lectures in general were boring and tiresome. There seemed to be very little 'glue' to hold the subject contact together some readings had little to do with the tutes and lectures, etc. (162) [This student had not enjoyed any of her first-year subjects: 'My subjects were not stimulating enough and fellow students appear jaded and bored with Uni'.

I enjoyed the biology based lectures most - concerned with diseases/plague, etc, as I am doing a Bachelor of Science (115)

Some of the topics we have done were very interesting, but the earlier bacteria-age topics thing before human evolution were too biological and boring.

The people in my tute were awesome. (136)

*More science - especially microbiology lectures
Some readings irrelevant
Early lectures did not adhere to tutorials - caused some confusion as to what we needed to learn
Too much art, not enough science!! (207)*

Less science, more history (202)

with many of the lectures written at the last minute and the tutorial guide had to be written before the content of about a third of the course was known. While we paid a heavy price for this, at the same time, we found we were able to make many last-minute adjustments to our approach and lecture content.

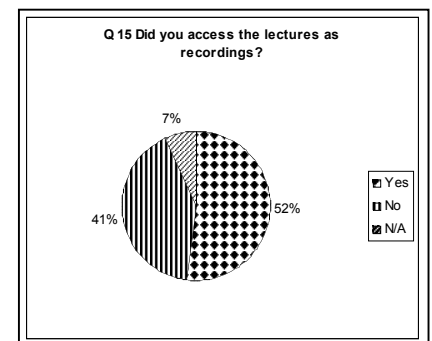
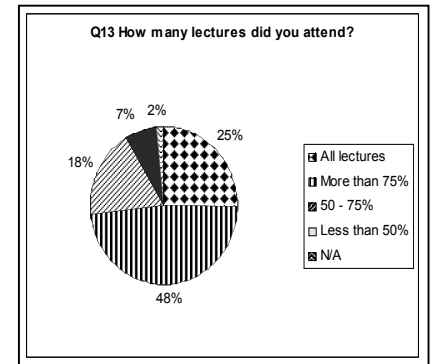
Our audience, imagined and real

It was difficult to imagine the audience we would be addressing. No one could predict who would enrol in what; what class sizes would be; and what background knowledge and skill-sets among our students could be assumed. Furthermore, 'interdisciplinarity' is not necessarily exciting to first-year students who scarcely know what a discipline is and have not had time to become impatient of 'boundaries' and eager for 'integrative' understandings. We expected reasonably good enrolments, but we did not expect to see our numbers grow to 450 in the first week of teaching, then fall back to 367 as students changed their minds about their subjects, confounding our careful tutorial organization.

We were prepared for a mixed class, with at least half with a science background who would need a different mode of teaching and learning. Instead we faced a class where over 70% were from Arts because they found that most of the other breadth subjects on offer contained 'too much science'. We were prepared for the almost phobic anxiety about 'maths', 'formulas' and 'scientific terminology' that is common among arts students, but we were not prepared for the majority of the class being so afflicted. Likewise, science students are often convinced they cannot write prose and in their first semester of university have not yet learned that a science degree is not a passport into a world without writing.

First year students are always a challenge, as well as a delight. We were aware from the beginning for the need to keep students connected to something while they cope with starting university. There are always a few who really don't want to be there at all; there are those still feeling the effects of a stressful VCE year and we had the usual caseload of glandular fever and personal difficulties. (36% reported missing time at university through illness or personal difficulties.) Finding accommodation in Melbourne was a serious problem for 5.4% of students and others had major difficulties with internet connections (13.4% – the equivalent of over two tutorial classes) and just 46% reported that their internet connection was 'easy'. Finally, 55% were in paid employment: 15 students were working more than 20 hours a week, 29 working 15-20 hours, 47 working 10 to 15 which mostly meant two shifts. From this, around 91 of the 277 who answered the survey, were working to the point where their fulltime studies would be compromised.

For the first year of the Melbourne Model, inevitably there were some



who were rather irritated that the university they had long aspired to attend had to go and change everything just as they were leaving school. There was some possible resentment at the very idea of 'breadth', of having to leave their comfort zone, and of being diverted from their core studies. There was considerable anxiety, partially generated by misinformation received by students, that the Grade Point Average for entry to their desired graduate school would include all their undergraduate subjects and that they needed to choose breadth subjects on the basis of maximising their marks rather than broadening their minds. As a result, across the university, many students chose subjects that were as close as possible to their core disciplines. That said, 70% reported that they had enjoyed their first semester at university; 13% only admitted that they had not, the balance choosing to remain silent. 85% said they had made new friends during the semester; just 3% had not and 17% would not answer.

Teaching strategies and goals

We knew that if this subject was to work, that it would be won or lost in the tutorials and in the students' commitment through the semester. We were also well aware that even at the university with the highest ENTER scores, many students arrive ill-prepared for independent university study. We were also aware that we needed to allow for differing learning styles and that this was especially so in a university breadth subject open to students from all six New Generation degrees. What were the common needs of students for learning skills?

We decided to focus on some key learning skills that crossed the disciplinary divide, keeping in mind that the task of all university students is to learn how to work within the global network of refereed scholarly literature. This is a gradual process that requires not simply technical skills, but also disciplinary content knowledge. In this first year subject we could set them on the first steps. We were also aware of research from the medical school that students' use of internet sources was alarmingly uncritical: that the first research act of students was to 'google' rather than conduct a library search; to use Wikipedia before authorised, refereed texts; and rarely to pursue a google search beyond the top three 'finds'. Therefore we structured our tutorials to introduce the students to a sequence of learning skills in core information literacy and research skills. They learnt about citation, checking the 'authority' and qualifications of 'experts', using journal articles, summarising a book chapter and an introduction to scholarly disputes and debates.

Second, we were well aware of how easily tutorials can descend into monologues by the students whose 'turn' it is to produce a class paper, while there is little participation from other class members because they have not done any reading. We wished to avoid a situation in which

More feedback - tutors shouldn't be responsible over so many students - need smaller groups, more intimate and understanding. More linking between weekly topics and better linked to tutorials although sometimes hard to link relevance. (176) [classes had 15 students]

This subject has the potential to be fantastic and highly interesting, but it is exceedingly poorly organised and taught. Get it fixed!! I am really disappointed. (155) [This student attended few lectures and has not enjoyed first semester at university at all despite living in college. He/she found the expected standard of academic work generally was 'very challenging' and has missed classes because of personal difficulties/illness]

The content was soooo boring, most of the time, the issues were so irrelevant, we had no idea when/were/what was going on (228)

On the whole, Arts students should NOT be forced to do Breadth subjects because we end up doing these one semester 'Uni-breadth' subjects that have never been trialled before and do not advance our degree in anyway. They also limit our opportunities to pursue core-arts subjects which is compromising the integrity of the Melbourne Uni Arts Degree. (14) [Living in college; did not enjoy uni; chose 'bad subjects']

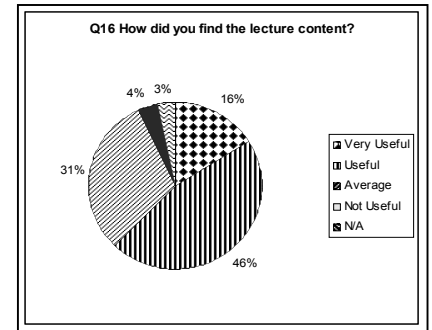
tutorials became ‘third lectures’ in which the unfortunate tutor was left doing most of the talking. Requiring students to produce summaries of the set reading before class seems to ensure that there is a basis for a better discussion. Therefore, the strategy for the tutorials would be for students to be set varying research tasks, to produce notes and visual material on a tutorial wiki site before the class and for the focus to be on note taking, correct citation, and organization. We also hoped that this would allow students to employ their various learning styles and to gain experience in ‘explaining’ the ‘science’ or the ‘history’ to others: in other words, knowledge transfer. Indeed we set a research question on the significance of mitochondria for human population history where the student was asked to produce an explanation that was comprehensible to a non-science student. And most who attempted this, did a good job.

Third, the course co-ordinator produced a richly illustrated and detailed tutorial guide using the LMS wiki tool, providing a working space online where students would be directed to new ideas, internet sites, and which linked to the additional research reading, most of which came from books. (Journal articles are generally too specialised for undergraduate students before final year.) There were multimedia tools, maps, links to research sites and a glossary. They could blog if they wished and the class wikis could be interactive. However, it would appear that few students bothered to take advantage of these additional resources, nor of the extensive online support provided by the University Library for research and writing skills. Certainly, almost 40 students had significant difficulties accessing the internet; but the remainder used the rich materials provided indifferently and a remarkable number revealed themselves to be ‘digital natives’ only on their mobile phones, needing help to use web pages. Many seemed to find the transition from schools where teachers were always on hand to answer the smallest need, unsettling. Some students appreciated the formative continuous assessment; others found the deadlines difficult to meet.

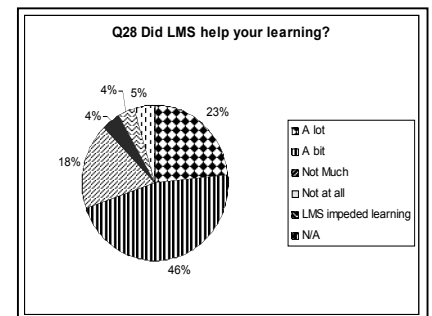
From the coalface: the experience of a tutor

Walking into a tutorial room in the Old Arts building at 9.00 Monday morning, the very first tutorial for the semester and, for most of the class, their first experience of university, I was surprised at the attendance. Nine o’clock in the morning was a challenging timeslot for young people and yet, all those allocated to my group had showed up and were, like their tutor, eager but nervous about the journey (roller-coaster?) that was to be *An Ecological History of Humanity*.

After we had all introduced ourselves at the first tutorial, it became clear that most were studying Arts. Some even warned their tutor that they ‘hated science’. As the introductions went on, I began to wonder if the ‘history of humanity’ had attracted students who hoped the ‘ecological’



Tutorials were brilliant. _____ is an excellent tutor and made the subject matter much easier to understand, particularly when the lectures started - they seemed only barely connected and the tutorials were important in giving coherence to the subject matter. (198)



component meant that this subject would be the most 'arts focussed' of those University Breadth subjects on offer. The imbalance between arts and science students was disappointing because it limited the breadth of knowledge and perspective within the class that I could draw on to facilitate discussion.

From the beginning, the communication of scientific concepts was one of our main challenges, although in the eyes of some of the lecturing staff these were 'watered down'. Many Arts students struggled with the introductory lectures on physical geography and human evolution. Some became overwhelmed and withdrew from tutorial discussions, and the unfamiliar material and technical terminology compounded natural nervousness about the new university tutorial experience. However, when good tutorial topics tied the readings with discussion effectively, the science became a little more accessible.

In those tutorials that did include some science students, we could use their knowledge to help explain the material to their peers. This developed group cohesion as students worked together to digest the concepts and relied on each other rather than the tutors and lecturers. This, in fact, had been one of the key teaching aims for the subject: for students to practise communicating their specialist knowledge to others who might not share their particular aptitude. Unfortunately, the enrolment profile of the class undermined the strategy.

After three weeks of teaching, it was clear that many were missing the underlying theme of the evolution of 'humanness'. We changed tack and decided to dramatise 'different ways of knowing' by holding a tutorial debate over what constituted 'humanness'. We presented them with an academic controversy: 'The Science of Gender and Science' over the respective aptitudes of males and females for the hard sciences. This debate, between Harvard professors Steve Pinker and Elizabeth Spelke, published on the Internet with text and audio, aroused students' interest (and passions). Students began thinking about nature versus nurture and about uncertainty and ideology in scientific discussions. They were introduced to perspectives that ranged from cognitive science that argued for hard-wired genetic attributes in humans, to the cultural constructions of gender. Many recalled this debate as one of the highlights of the subject.

The tutorials where students completed readings and discussed them together tended to suit the humanities and social-science portions of the subject better. The analysis and of texts and images was facilitated by the wiki, but the shortage of IT enabled teaching spaces made simple paper-based activities the only realistic option. Arts students flourished in the later tutorials as they had the knowledge and more interest in the

I enjoyed learning exactly where it all started. As a humanities student, I'm guessing I won't see too much science in my studies, so this stuff was a good break from my other subjects. I also thought the tutes were done well, maybe some of the readings were a little long winded, but generally interesting. Overall, I enjoyed this tute very much. I was able to get here at 9 o'clock every Monday except for 1, which is pretty good. (131)

I enjoyed the historical aspect when in regards to humanity. I strongly disliked the 'science' side of the subject especially topics such as bacteria and the domestication of wheat. (217)

materials discussed in later lectures. This may have been a contributing factor to the disproportionate numbers of Arts students in the subject's highest marks.

To finish the semester, a dramatic final tutorial was developed as a debate between students over the pros and cons of what David Christian called the 'modern revolution' of industrialization and advanced technology. Students were expected to draw on examples from previous weekly topics as well as their own knowledge of current affairs. In a similar way to the subject's exam, this proved a very successful exercise in encouraging students to think about the big themes from the subject. It was also helpful to encourage students to relate the historical and scientific material they had learned to contemporary issues and current world problems.

The scope of the subject was ambitious and students were certainly challenged by the big history approach. The textbook *Maps of Time* was an excellent narrative that helped pull the different elements of the subject together. While it proved a daunting read for first year students, most tutors discovered the challenge of the material to be a useful teaching tool. Tutorials could focus on understanding the often-detailed accounts of scientific concepts and technology combined with social theories. Also, the weekly wiki assessments required students to summarise, explain and contextualise difficult book chapters or articles. The initial disquiet at the subject content being 'too hard' appears to have had more to do with the stresses of starting university and the technical problems we experienced with online assessment. In student feedback and in tutorial discussions, it became evident that students did appreciate the unifying narrative provided by the central textbook despite its length and occasional complexity.

Linking Lectures to Tutorials

A major student complaint was a perceived lack of connection between the lectures, readings and tutorials. Students, usually with the misapprehension that the most important material came from the lectures, became disillusioned and disengaged from tutorials when *they* saw little relevance in what they were discussing. They were less motivated to do their preparatory reading, which in turn affected their ability to participate in tutorial discussions.

The problem seems to be not that the lectures, set reading and tutorials were not linked, but that these links were not explicitly spelled out for students. For the staff developing the subject, the relevance of the broader narratives in the lectures to the case studies and discussions in tutorials, was obvious. Unfortunately, students often did not see this. Nor did they read the subject guide with the attention required. They needed

I hated the introductory aspects of the subject with the overwhelming attention on science! However, as the subject gained a humanities perspective, I found it a lot more interesting and gave me a broader education. (18)

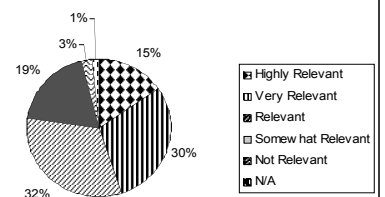
The tutorial discussions were the best. It helped me learn the most. (40)

The discussions in tutorials were good as many people were involved. I like the idea of wikis because everyone can access research and info but by not doing all the work. (23)

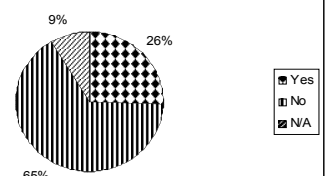
To be honest, I didn't really like any of it. I did enjoy tutes though. (27)

I enjoyed tutorials because they engaged us and cleared things up and our tutor was excellent. Lectures were well below average. (147)

Q23 How would you assess the relevance and effectiveness of tutorials?



Q31 Did you use the ebook of the text "Maps of Time"?



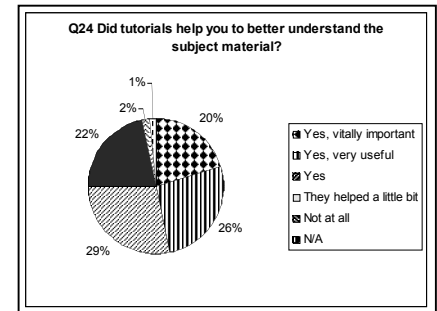
reminding of a central narrative of big themes that tied the science and history together, and the students who had grasped these key ideas wrote high quality exam responses. A challenge for breadth subjects is establishing these concepts early on in the subject through the lectures, and tutorials, and repeating them continuously so that those students who engage sporadically, can still 'get it'. A key place where this could occur was the weekly tutorial guides loaded on to the LMS. The benefit of using LMS over traditional semester long printed guides was the flexibility it gave us to explain material as it went along. However, what can be achieved in small group teaching and subject guides depends ultimately on students completing the set reading, exploring the resources provided, and thinking about the subject material. Unfortunately, this was something that a sizable portion of students consistently failed to do.

Assessment

Students who complained of unstructured assessment and 'vague expectations' were often those who were uncomfortable with the self-directed learning expected at university. Because of the broad scope of *An Ecological History of Humanity*, we encouraged students to explore topics from a multitude of perspectives, and consequently, set some open-ended questions for their weekly short research 'wiki' and longer essay topics. This approach unsettled 'strategic learners' trained to focus on discrete tasks for discrete rewards.

Those students who actively engaged with the subject, who understood the concept of 'big history', did well with these tasks and used them in innovative and interesting ways. However, there were students who floundered without the structure they were accustomed to. This was particularly the case for the short, 500 word wiki-tasks, in which some students struggled to understand what was required, even though the tasks from week to week were structured, cumulative and explicit. The first task was a summary of a chapter of Christian, which was difficult, but manageable if students followed the advice provided to utilise certain headings in the text. Few seemed to notice or follow this advice. Instead, tutors spent large amounts of time counselling students individually on how they might approach these topics and an unacceptably large amount of tutorial time was spent explaining the assessment requirements. The resulting low marks for these tasks were partially a result of this, although first assessments at university are commonly a 'shock' to students accustomed to high marks in the smaller pond of secondary school. In hindsight, it may have been preferable to have even more structured assessments early in the semester that could then be loosened as the subject went along and students understood more of what constituted 'big history'. The flexibility allowed in assessment also posed problems for tutors who were faced with diverse answers on

"Lectures were very boring and in the beginning, it was very irrelevant. It only started getting interactive towards the end. Also, some of the weekly readings online were totally irrelevant to the tutorials."



'Lecture content could have been more complete as what they want us to learn' (158)

'The exam layout is terrible. We have no idea of what we are supposed to do' (155)

similar topics that were difficult to grade on a common basis.

Interdisciplinary assessment and its problems

An aim of University Breadth subjects was to encourage students to work outside of their comfort zone—for those with a humanities background to attempt to engage with scientific concepts and those with a science background to engage with historical thinking.

In practice, this interdisciplinary assessment proved difficult to manage fairly. We tried to provide for different learning styles, but that tended to advantage arts students who found they could write quick pieces and avoid engaging with any science content, while the science students, labouring under the misapprehension that studying science meant never writing an essay, struggled resentfully with their writing and organization. Having different forms of assessment—essays, posters, PowerPoint presentations—only encouraged weak students to submit weak assignments and proved very difficult to mark equitably. Arts students did significantly better with the written work and some reported that the assessment was easier than in their mainstream subjects. We need to find a way to stretch all students and to ensure that they show that they are engaging with the unfamiliar: perhaps a longer research project that includes submitting a proposal that demonstrates some interdisciplinary engagement. We need to place more emphasis on conceptual formulations of the issues rather than accept narratives as sufficient, and we need to be more explicit in outlining the research expectations of all assessed work.

Another way to approach this problem is to admit that we may have been too conscious of the ‘two cultures’, and should in future, focus more on the academic skills and practices that all disciplines share across the university: question setting, literature searching, evidence gathering, critical evaluation, citation, data analysis, argument formation and explication. Perhaps this is a case for establishing some common assessment criteria across the University Breadth Subject programme. Science graduates have to be able to write about science in prose, construct arguments and think critically. These are not skills that apply only to arts graduates.

That said, it would still be desirable if all students had some hands-on encounter with science, but with such a large class, laboratory sessions or interaction with live animals were simply not feasible, neither is it always possible to find tutors who are qualified in both science and humanities, and some had difficulty in marking work unfamiliar to them—although they could always seek a second marker.

The wikis, despite the complaints of some students, worked for many. They allowed collective learning, in particular in understanding complex

‘...The assessment was not very difficult at all which was good. The readings were generally easy to read and interesting, however, I often did not do them.’ (14)

‘Need to cater for people with science based backgrounds. As this is a uni wide subject, little actual ‘teaching’ on how to do research, reading. Global thinking occurred was mainly ‘here is some stuff. go read.’ Hard for people with no writing/Arts backgrounds. Readings were sometimes excessive. (158)

Learning about the history and interconnectedness of the world and its parts. Seeing things from different perspectives. Wikis were great. (38)

Tutes were really helpful; fun; friends made

Assessment - I like! Wikis x 3 of 500 words is a good amount. Not something to stress over but enough to gain a good understanding of your topic. Exam of 30% also good! (44)

texts and concepts, aided tutorial preparation and provided greater flexibility for different disciplinary perspectives. For instance, some wiki tasks asked students to explain scientific concepts that came up in readings and lectures, or complex texts were broken up and summarised collectively. Tasks were set for students to contextualise articles within broader debates or present outlines of more detailed works to their peers.

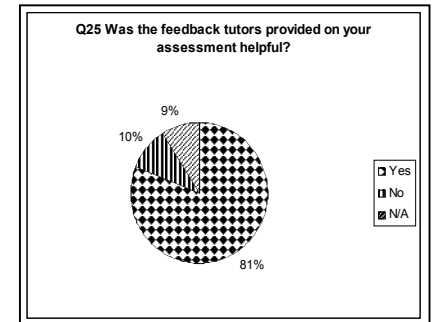
Teaching skills

A key teaching focus for *An Ecological History of Humanity* was basic information literacy. Typically, tutors devoted 5 to 10 minutes at the beginning of tutorials to discussing with students key skills—citations, appropriate referencing, essay writing, using the internet critically and verifying of sources. Each tutor was provided with a teaching guide for each week that suggested topics they could raise with students. For their early wiki assessment tasks, careful feedback was provided to students on techniques for researching, writing and citation. In addition, tutors pointed students towards resources from the University Library, the Academic Skills Unit and the LMS subject page contained links to all of these.

Despite these efforts, there remained throughout the semester a poor standard of basic academic skills such as providing citations, continuing use of unverified facts from sources such as Wikipedia, despite advice on how to use the resource critically. At worst, there were examples of students repeating errors pointed out to them suggesting many had simply ignored their feedback. However, the overall performance of most students on their research essays showed a lack of research skills, including those who actively engaged with tutorials and excelled on the exam.

The exam

A very successful piece of assessment was the exam. It simply asked students to “Write about 4 (four) different things that you have really valued learning in this subject” and encouraged them to relate these to current problems in the world. While their comments show that some students panicked at this open-ended task, the question received excellent responses from students who had engaged with and thought about the subject and its broader themes. Importantly, it also forced them to recognise how history affects the current day and how ‘the surface brilliance of events’ fits into longer-term trends. This also provided a useful corrective that showed many students who embraced and ‘got’ big history were let down by poor research skills in their other assessment tasks. This was particularly the case for science students of whom over 50% did better in their exam compared to their research



This predominately related to middle-band science students who did significantly better on their exams than on their research projects. Far fewer Arts student achieved a higher mark on their exam than their research project.

Overall:

For the Research Project, Arts students constituted 78% of H1s, 76% of H2As, and only 45% of the Ps. [P = 50-64%].

Exam marks also comprised of high percentages of Arts students - 89% of H1s and only 43% of Ps

project.

Stretching expertise to its limit

The value of having experienced tutors when delivering innovative curriculum quickly became evident. Because the lectures were delivered by a team of academics with different styles of delivery and expertise, the tutorial was where students had the most consistent interaction with the subject. Tutors needed to be able to relate the broader underlying themes to students, often from lectures they had only just heard themselves, and often to help their classes understand concepts well outside of their own disciplines. For example, in a tutorial I was asked by a student to clarify the difference between the early hominids species *Homo habilis* and *Homo ergaster* that had been referred to in the textbook. For a tutor whose background was in the humanities and who up until that week had not known there even existed *ergasters* or *habilis*, the question was challenging. The student was directed to look the information up for themselves or speak to the lecturer. While this was the perhaps an example of a student expecting tutors to be like their high-school teachers, the sheer scope of interdisciplinary teaching exacerbates the problem of tutors having sufficient expertise in the material they teach. Tutors at first year level also need to be able to adapt their teaching style for students who were not yet comfortable with the workings of university tutorials. The tutors who delivered *An Ecological History of Humanity* coped amazingly well, especially those who had little experience and had received little tutor training. Nevertheless, there remained a problem of new tutors struggling with difficult tutorials that did not work well together either as the result of disruptions early in semester or through small numbers of disengaged and disruptive students.

Information technology

A source of student concern was the innovative use of information technology applications. In hindsight, this may have been perhaps an overambitious plan for one subject. But seeing we had created a new interdisciplinary subject, we felt that we had to follow the lead with technology and moved all its assessment and readings to an online Learning Management System (LMS). Three principal problems emerged.

Firstly, students struggled to navigate the LMS site and use the tools to create their online assessments. In particular, the text-editing Wiki tool frequently 'messed up' the formatting of students' work when they uploaded to it. This seemingly minor technical issue meant more work for students in trying to get their work to look the way they wanted and tutors spent a lot of time acting as IT support. The wiki tasks were an excellent

Only around 10% of our students requested feedback for their final essays.

Have a reader in hard copy - online readings are really annoying. Staring at a computer screen for so long is painful and it is inconvenient that readings can only be done on a computer - readers can be taken anywhere. (196)

Everyone in my tute expressed their dislike towards the online readings.

Personally, I find it a lot easier to absorb information when I have a hard copy in front of me to interact with.

The online readings nature of the subject isolate those who don't have ready access to the Internet, or who are having computer problems. (43)

pedagogical tool that suffered sorely from technological problems. Part of the students' early stress in the subject can be blamed on difficulties in navigating the technology. While LMS familiarisation is available to students through the university library, appear to have taken this up. The experiences of this subject suggest that the assumption that the current generation of students are IT savvy is naïve and their ability to utilise online academic tools should not be taken for granted.

Secondly, while potentially a powerful tool, the online collaboration on LMS proved a challenge to administer with such a large and fluctuating attendance. During the early weeks of semester, the head tutor spent a disproportionate amount of time manually shifting students between tutorial groups and online groups.

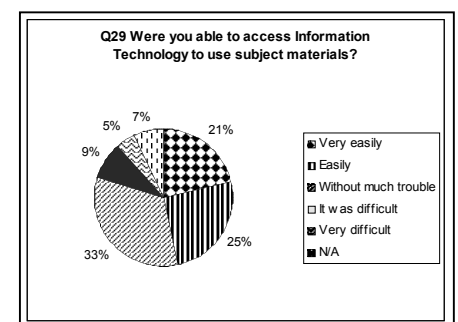
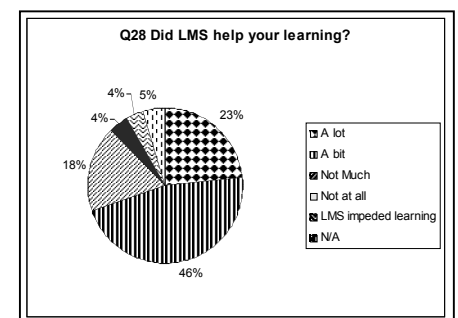
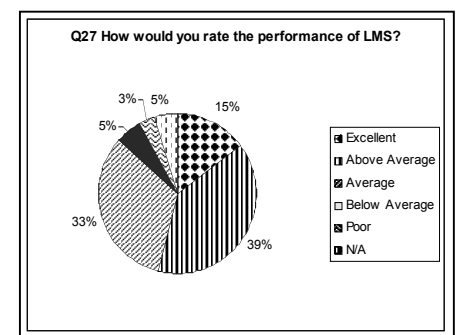
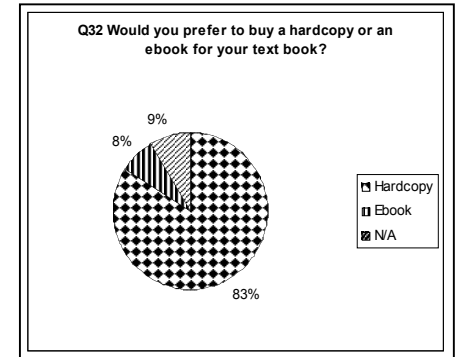
Finally, the exclusive use of online readings proved an unreliable and quite unpopular format. For tutors, the most frustrating aspect was the frequent glitches in the system where online documents would 'disappear', downloading would not work, documents would be locked or windows would freeze. This potentially meant that a large number of students were unable to access the readings and *could not* prepare for tutorials. In the future, we will use a hardcopy paper reader in conjunction with online content.

This heavy reliance on information technology also posed equity issues for those who did not have easy access to computers at home, which it appears comprised around 20% of the class.

Another attempt at innovation was to include a greater amount of computer use in tutorials, perhaps utilising interactive websites or referring to the wiki work of students to facilitate discussion. However, little benefit was found from using this. Overuse of computers tended to focus students' attention on one point and undermine attempts to get students talking themselves. Also, because of the large numbers of students, it was impossible to have all tutorials in rooms that were equipped with computers or data projectors.

Unfortunately, due to the early disruptions such as the turnover of enrolments, IT problems and less confident tutors, some students were discouraged. However, the single most important determinant of whether the students enjoyed the subject and knew what was expected of them, was the tutorial. Of the 26 tutorial groups running for the subject, only a handful had major problems, and the success of the subject was largely due to the dedicated work of the tutors.

There was considerable variation in whether students 'got' the big picture or remained rather lost. Most, it seems, did 'get it' by the end of the semester. Those who did not may have included some who are not naturally 'big picture' thinkers; and those who did very little work during



the semester would also have been left behind. Many who complained about either the 'science focus' of the early lectures or the 'history focus' of the later lectures, were complimentary about the bits they felt comfortable with. Many praised individual lectures, and for all those claimed that the subject was disorganised, others found the reverse. *An Ecological History of Humanity* succeeded in pleasing many much of the time, but few all of the time.

Bringing the horse to the water and getting it to the 'other side'

An Ecological History of Humanity was a qualified success as a University Breadth Subject. About half the class enjoyed and valued it and about half did not. It's likely that some will think more highly of it in retrospect when they have more experience of university study in particular, and of life in general. There are a number of things we can address and, we hope, fix. But the problem remains that a core reason for the subject not being more enthusiastically received by all students was their resistance to learning outside their own comfort zone. Yet this is exactly what the Melbourne Model is trying to overcome: to give them breadth outside their proficiencies, to make them more flexible and creative in the workplace, and to provide the integrative learning that assists the practical application of expertise.

The Two Cultures

CP Snow's now classic essay on the 'Two Cultures' has unfortunately stood the test of time. The shifting boundaries between disciplines within the sciences, the humanities and the social sciences, have made little impact on the fundamental divide between the way humans see, interpret, analyse and explain the world i.e. between words and mathematics. While there is a spectrum of human abilities, with maths savants on one extreme and the irredeemably innumerate on the other, between reside most human beings with probably a fair chance of mastering basic and middle-level skills in numeracy and literacy. That so many claim that they are 'hopeless' at one or the other is more a reflection of the deficiencies of secondary schools than of human potential.

The feedback was that at least half the class came round and successfully 'crossed to the other side' and found that it was really very interesting. However, a rump of angry students remained to the end and had a toxic effect on some tutorial groups and on general discussion about 'breadth' outside the class. At least with University Breadth Subjects they are not compelled to take any one subject and we can hope for fewer students making the wrong choice in the future. Even so, not a few resented that 'breadth' overall was compulsory, even if individual subjects were not. There will be pockets of anger about

There needs to be more focus on something specific each week it feels like we are doing something irrelevant to the last. And the "choose your own adventure" idea of the course creates confusion, more direction is needed. (246)

Less literary references i.e. poems and songs and quotation. I'm sorry Janet, but we are not all Arts students and sometimes facts and figures are better than some old guy talking in ye old english and the like. (233)

It is not suitable to me or my interests. I did not know that a lot of science is in it too. Human evolution for instance was not mentioned at all in the orientation/information days.

The information is too broad - can't remember much by the end of semester. (248)

Make it more cross-disciplinary. When told we would have multiple lecturers I also assumed they would have equivalent teaching time. I want more lectures from a medical perspective, an economic perspective (have an economics lecturer!), plus many more including the current geology and weather focuses. Have the progression of lectures more flowing and presented in a way that supports all the info from different places coming together. [1]

'breadth' in the Melbourne Model for some years to come that will be grist to the mill of those wishing to find fault.

Does the customer always know best?

Education is a domain where customer preferences, while important, cannot be permitted to rule. Discipline experts, in professional and general education, are expected by society to be able to decide what it matters to know. That does not mean that the customers' responses are not essential to the task of improving teaching and learning. However, at some point, despite student hostility, we have to say that 'this is something that you need to know if you are to function in a complex, difficult world'. As we face climate change and the collapse of the global economy, never before has it been more important for all people to be able to understand in general terms how the world, both social and natural, works and interacts. We know our graduates will need a basic literacy in science, data analysis, political and social systems thinking, cultural sensitivity, philosophical skills, and historical perspective. We may not be able to teach many of them in multi-disciplinary modes where they switch seamlessly between 'different ways of knowing' beyond group exercises in problem solving. We can however, reach many more, if the various disciplines are worked together in chains of discovery and explanation that are then integrated into a unifying discourse. If a subject is to be inclusive and to practise fair assessment, then it needs to be conducted in a common language. If that will disadvantage some students who are less adept at either the language of words and pictures or the language of formulae and abstraction, then provision needs to be made in the research components of a subject for them to have the opportunity to excel.

Ultimately, we have to persuade each 'side' of the two cultures, that it is still 'science' when we talk about science and society, and it is still 'history' when we delve into the mechanics of herd immunity. And we have to maintain the faith that the future facing the world will require wiser, more flexible and more informed graduates than some of our youthful critics yet realise.

And despite the complaints of 'irrelevance' and boredom, many found *An Ecological History of Humanity* transforming. We conclude with the testimony of a male student enrolled in the Bachelor of Commerce, who opened his exam paper with:

This subject was the first to catch my eye. I had always been interested in 'big history', such as the origins of life and how things came to be the way they are now, but I never really did a history subject in my high school years, as they mostly focussed on a particular period I was not interested in. What I was interested in, though, was everything that this class offered.

In my first week (which was the second week of the course) I found it hard to get a foothold in things. Having never done any history or science subjects, many of the ideas discussed in lectures were new to me, and at first I found the set-up of tutorials to be confusing. Though I decided to stick with it, as I knew that after a while things would get interesting and I would get into the flow of the course. I began to enjoy the subject. I enjoyed learning new things in lectures, things that I could go home and discuss with my parents, things that were enjoyable to delve further into in my own time. I also began to enjoy the tutes, where everyone was given a chance to voice their own opinions about a topic.

I realise that we are supposed to talk about things which we valued learning in this subject, but for my first essay, I felt it necessary to talk about the subject as a whole, as this has been the thing that I have most valued in my first semester at university. It has been very enjoyable, both intellectually and emotionally, and I shall take the ideas which I learnt in this subject with me wherever I go. This subject has changed my views of the whole world.

FRANKS, D., PATRICIA DALE, RICHARD HINDMARSH, CHRISTINE FELLOWS, MARGARET BUCKRIDGE, PATTI CYBINSKI (2007) Interdisciplinary foundations: reflecting on interdisciplinarity and three decades of teaching and research at Griffith University, Australia. *Studies in Higher Education*, 32, 167-185.

LE ROY LADURIE, E. (1971) *Times of Feast, Times of Famine: a history of climate since the year 1000*, New York, Doubleday & Company, Inc.

ROTBURG, R. I., RABB, THEODORE K (1970) Interdisciplinary History. *The Journal of Interdisciplinary History*, 1, 3-5.